C.9 RICHLAND OPERATIONS OFFICE AND THE OFFICE OF RIVER PROTECTION SUMMARY

NOTE: This site summary provides information and data for sites under the Department's Richland Operations Office and the Office of River Protection. The data for this summary were collected in 1999 and do not necessarily reflect funding or completion profiles for the site. The data do not include changes that resulted from actual FY 2000 appropriations or anticipated changes as a result of both FY 2000 supplemental and FY 2001 budget requests. The Department is in the process of updating its life-cycle information for the EM program.

The 1999 data were the basis for DOE's *Status Report on Paths to Closure* (March 2000). The costs in the "Cost and Completion Date" section of this summary are the sum of the project planning baselines prepared by the field office and generally do not include estimates of project uncertainty. On the other hand, the cost range in the national status report includes an estimate of the cost resulting from project uncertainties, and EM's overall estimate of life-cycle costs of $151-195 billion from FY 2000 to FY 2070 (or $168-$215 billion if the costs incurred between FY 1997 and FY 2000 are included in the cost range estimate).

The Richland Operations Office and the Office of River Protection manage the cleanup work at the Hanford Site. The Hanford Site occupies 1,517 km^2 (586 mi^2) square miles in southeastern Washington State. In 1943, the federal government developed the first full-sized plutonium production operation. The Hanford Site has been used for a variety of purposes, including plutonium production, chemical processing, waste management, and research and development activities.

The Office of River Protection was established by Congressional mandate to focus on the high-level waste tanks at the Hanford Site. Creation of this office streamlined the management structure of this important program. The Richland Operations Office currently manages the facilities and inventories of special nuclear materials, remedies environmental contamination caused by decades of activities related to the production of plutonium, and supports national research efforts in the areas of environmental cleanup and other sciences. Richland Operations Office cleanup mission areas include the following projects as well as supporting projects: waste management, facility transition, environmental restoration, and science and technology.

After the defined Environmental Management (EM) cleanup mission is completed at the Hanford Site, the federal government will continue in a caretaker role due to disposed waste remaining on site. Ongoing missions at the Hanford Site will also continue primarily in the areas of science and technology.

C.9.1 End State

A Comprehensive Land-Use Plan for the Hanford Site lands was developed and finalized through a cooperative effort with the Department of Energy (DOE); the Confederated Tribes of the Umatilla Indian Reservation; the Nez Perce Tribe; the United States Department of the Interior; the City of Richland; and Benton, Franklin, and Grant Counties. The Record of Decision (ROD) for this action was based on the information contained in the *Final Hanford Comprehensive Land-Use Plan Environmental Impact Statement* (HCP EIS) (DOE/EIS 0222-F) for the Hanford Site, and other factors including the mission responsibilities of DOE.

DOE implemented concepts from the HCP EIS to create the Comprehensive Land-Use Plan (CLUP). These included the DOE Preferred Alternative land-use and the land-use definition, policies, and procedures contained in Chapter 6 of the HCP EIS. The Preferred Alternative expands the proposed U.S. Fish and Wildlife Service overlay wildlife refuge to include the entire geographic area of the Wahluke Slope, the Columbia River islands not in Benton County, the Riverlands, the McGee Ranch, and the Fitzner/Eberhardt Arid Lands Ecology Reserve. The CLUP protects the Hanford Site shrub-steppe ecosystem and the Columbia River, while allowing for use of the Hanford Site, as the need arises, and full implementation of the DOE mission elements assigned to Hanford.

Currently, the federal government will remain the landlord of the site after cleanup is complete. Cleanup levels and disposal standards will be established through the regulatory process as outlined in the TPA; and remediation will be performed to ensure the protection of human health, the environment, and the Columbia River. Groundwater use remains restricted indefinitely.

The 100 Area of the site lies along the Columbia River and is comprised of over 400 waste sites, nine retired plutonium production reactors, and the reactors' ancillary facilities. Residential cleanup standards, EPA's default standard where no publicly reviewed land-use plan exists, have been established as part of the Interim ROD for area remediation. With the completion of the HCP EIS National Environmental Policy Act ROD, DOE and the regulators are now revisiting the interim Comprehensive Environmental Response, Compensation, and Liability

Act of 1980 (CERCLA) RODs to determine if any of the CERCLA RODS should be adjusted to reflect DOE and the Hanford communities' promulgation of expected end states. The C-Reactor was placed into Interim Safe Storage, with plans to place seven of the other reactors into safe storage. The B-Reactor structure is expected to remain as a National Historic Landmark. Groundwater remediation is being performed to protect the Columbia River.

The 200 Area of the site is expected to be maintained as a waste management area. Waste from on-site and off-site sources is being stored and disposed in the 200 Area. The Environmental Restoration Disposal Facility will accept waste that meets acceptance criteria from all Hanford CERCLA sites, and will be expanded to have a capacity of more than four million cubic yards of waste. Approximately 700 waste sites will be remediated in the 200 Area. Remediation is expected to be completed through a combination of waste excavation and placement of soil barriers over waste sites. Tank waste will be retrieved and immobilized from the 177 high-level waste (HLW) tanks. The low-level waste (LLW) burial grounds will be stabilized and the Resource Conservation & Recovery Act of 1976 (RCRA) storage facilities will be RCRA clean-closed unless required for the ensuing caretaker mission.

The 300 Area is being remediated to meet industrial cleanup standards. Soil remediation is being performed to remediate over 100 waste sites. Facilities, which will not be turned over to the private sector for further use, will be demolished unless needed for continuing missions such as science and technology.

It is expected that the land near the Columbia River will be available for recreational use. Additional information about assumed end states and long-term stewardship can be found in the HCP EIS ROD.

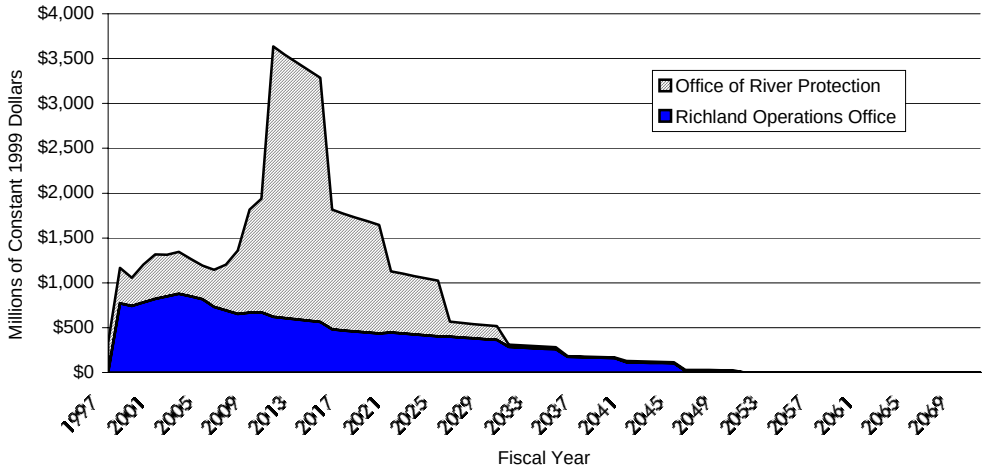
C.9.2 Cost and Completion Dates

The Richland Operations Office and the Office of River Protection have divided the EM work into 46 discrete projects, of which 36 are associated with the Richland Operations Office, and ten are associated with the Office of River Protection. A Project Baseline Summary (PBS) exists for each project and contains detailed programmatic information, including cost, schedule, scope, assumed end states, and interim milestones.

As of July 1999, the sum of the costs of the planning baselines from FY 1997 to FY 2070 for individual projects managed by the Office of River Protection and the Richland Operations Office is $55.6 billion (constant 1999 dollars). Of this, $32.8 billion is for the Office of River Protection. This baseline cost profile does not reflect any potential effects of budgetary funding constraints that will likely affect the overall life-cycle cost of Hanford Site cleanup. The current baseline supports the completion of EM work (excluding long-term surveillance and maintenance) by 2046.

The projected cost profile associated with the Richland Operations Office and the Office of River Protection was developed by combining the cost estimates from each PBS. Exhibit C.9-1 displays the resultant baseline cost profile. For additional information about these projects, see the individual PBSs.

Exhibit C.9-1
Richland Operations Office and
the Office of River Protection
Environmental Management Baseline Cost Profile



C.9.3 Accomplishments Since the 1998 *Paths to Closure* Report

The Richland Operations Office and the Office of River Protection achieved significant successes in several areas since the 1998 *Paths to Closure* report.

Accomplishments include the following:

- Treated 500,000 liters of groundwater through the five Environmental Restoration pump and treat units, exceeding planned availability of the equipment;
- Completed construction of Waste Management Project W-259 (HQ LI#96-D-408 T Plant Secondary Containment) one year ahead of schedule;
- Disposed of 350 million gallons of liquid effluents;
- Received an additional 1.1 million gallons of N-Basin water at the 2025-E-200 Area Liquid Effluent Retention Facility;
- Cleaned the 340 Facility above-ground tanks and the initiation of off-site shipments of mixed low-level waste to the Idaho Waste Experimental Reduction Facility at the Idaho National Engineering and Environmental Laboratory;
- Deactivated the B-Plant one year ahead of the Tri-Party Agreement schedule (four years ahead of the prior site schedule), saving taxpayers approximately $100 million;
- Completed the 105-C Reactor Interim Safe Storage program, a first-of-a-kind effort to place reactors in low-cost storage;
- Decoupled the Waste Encapsulation and Storage Facility from the B Plant three months ahead of schedule;
- Deactivated the N-Reactor deactivation;
- Completed construction for Project L-275 Emergency Services Personnel Consolidation; and
- Re-deployed several excess chemical tanks from the Plutonium-Uranium Extraction Process and the B-Plant to a local company for production of cattle feed.

In addition to the Richland Operations Office, the Office of River Protection has made significant progress on the long and costly path to remediating the HLW tanks. Start of operation of the new cross-site transfer line (Project W-058) has made additional tank space available, and pumpable liquids have been removed from many of the old single-shell tanks. Most of the safety issues have been resolved and will be closed out before the end of FY 2001 after almost a decade of intensive and costly engineering. The tank farm ventilation upgrades (Project W-030) have been completed, and continued progress on other upgrades continue to assure the safe operations of the tank farms and preparation for waste retrieval from the double shell tanks. A major effort, and a major portion of the Office of River Protection cost, is development of the privatization facility to treat and immobilize the tank wastes. Initial work by a private company, British Nuclear

Fuel Limited, Inc., has been started for the design, construction, and operation of the facility with private funds. The government will pay for successfully treated waste that meets repository requirements. This will be the largest environmental restoration project in the nation.

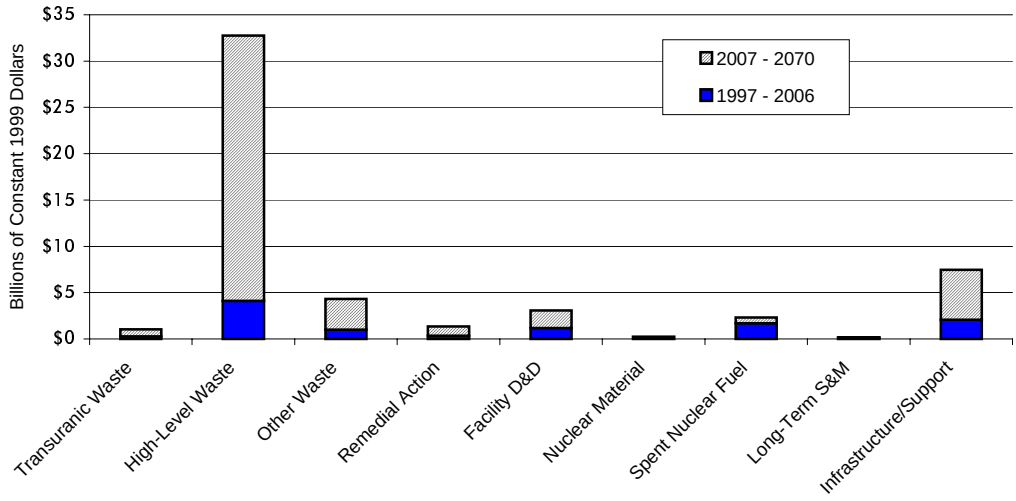
C.9.4 Work Scope Summary

The EM cleanup mission at the Hanford Site centers on the need to remedy the environmental contamination caused by decades of activities related to the production of plutonium. Having served as the nation's first full-sized plutonium production operation, the Hanford site's current EM projects are now specifically focused on minimizing, processing, and storing the backlog of radioactive and hazardous waste generated since 1943; managing spent nuclear fuel, and special nuclear material; decontaminating and decommissioning surplus facilities; and remediating the site.

The scope of work at the Hanford Site includes the management, cleanup, and disposition of soil, rubble, debris, and groundwater contaminated with radionuclides and hazardous substances. The management of HLW sludges, salts, and liquids also falls within the site's scope. More information about work scope can be found at the following websites, which contain links to the conceptual summary disposition maps (http://emi-web.inel.gov/summary.html) and the detailed disposition maps (http://emi-web.inel.gov/dmaps.html) in PDF format.

Exhibit C.9-2 displays the Hanford Site closure costs by major work scope category. As depicted in the exhibit, the majority of the cost involved in the completion of EM activities at Richland revolves around HLW.

Exhibit C.9-2
Richland Operations Office and the Office of River Protection
Life-Cycle Costs by Category for Low End of Range Estimate*



*HLW costs for Richland calculated by summing PBSs for the Office of River Protection.

C.9.5 Critical Closure Path and Programmatic Risk

The critical closure path schedule presented in Exhibit C.9-3 sets forth the estimate for completing closure activities at the Hanford Site. The Hanford Site critical closure path reflects those cleanup activities that are key to achieving completion of the site cleanup mission and end states. In Exhibit C.9-3, the highlighted activities collectively show the critical closure path, which represents the major series of events that drive the overall completion date for the site; the bars represent projects and activities, and the diamonds represent critical events and milestones that must occur for the Hanford Site to be completed by 2046.

As shown in Exhibit C.9-3, the critical path portrays the retrieval, treatment, and disposition of the HLW currently stored in the Hanford tanks. To succeed along this critical closure path, many other activities are also critical: (1) the reduction of urgent risks must have top priority, (2) the fixed costs for maintaining the site in a safe manner need to be reduced through facility stabilization and deactivation to make additional funds available for cleanup, and (3) the Environmental Restoration Project must remain a high priority because it results in visible near-term cleanup progress.

Completion of the EM mission at the Hanford Site as scheduled will depend on the timely accomplishment of critical activities and events. Sites have assigned programmatic risk scores to each of the critical activities/milestones. Exhibit C.9-4 portrays Hanford's projects and their associated activities and milestones with high programmatic risk (programmatic risk scores of 4 or 5 in any category). Several of these are on the critical path and are associated with the Office of River Protection project and the disposition of HLW. As previously stated, there are a number of other activities that are not on the critical closure path but are considered critical for overall success and therefore are shown on Exhibit C.9-3. These activities include Spent Nuclear Fuel, Waste Management, Environmental Restoration, and Facility Stabilization Projects. Each of these projects has high programmatic risks assigned to their associated activities and milestones. Exhibit C.9-5 displays a summary of waste disposition data that have high programmatic risk (programmatic risk score of 4 or 5 in any category).

Exhibit C.9-3
Richland Operations Office and the Office of River Protection
Critical Closure Path

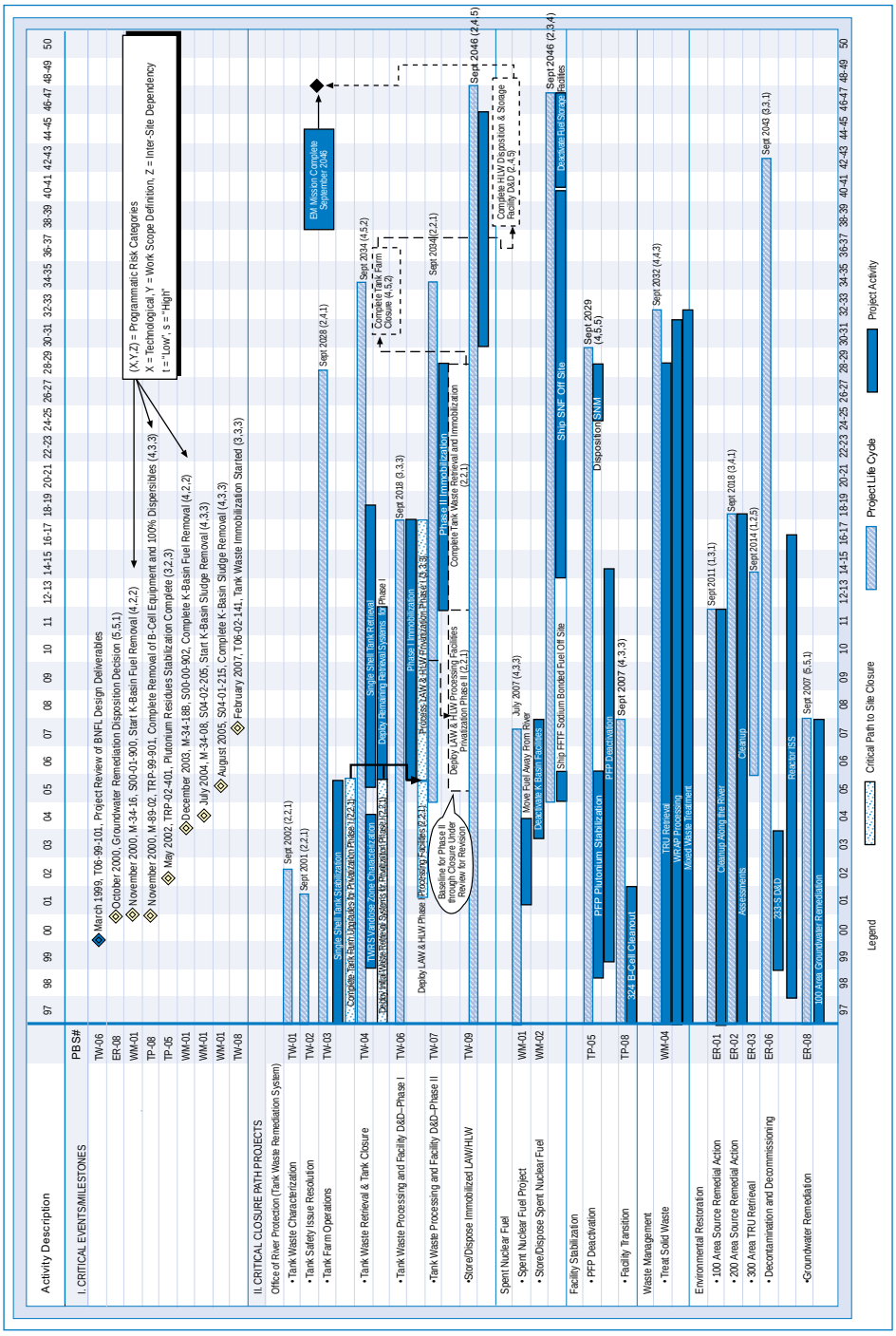


Exhibit C.9-4
Richland Operations Office and the Office of River Protection
Summary of High Programmatic Risk Milestones

Project, Action, Event	Dates	Programmatic Risk Categories*		
		Technological	Work Scope Definition	Intersite Dependency
Groundwater Remediation Disposition Decision	October 2000	5	5	1
Complete Removal of B-Cell Equipment and 100% Dispersibles	November 2000	4	3	3
Start K-Basin Fuel Removal	November 2000	4	2	2
Complete K-Basin Fuel Removal	December 2003	4	2	2
Start K-Basin Sludge Removal	July 2004	4	3	3
Complete K-Basin Sludge Removal	August 2005	4	3	3
Tank Farm Operations	September 2028	2	4	1
Spent Nuclear Fuel Project	July 2007	4	3	3
Facility Transition	September 2007	4	3	3
ER Groundwater Remediation	September 2007	5	5	1
300 Area Source Remedial Action	September 2014	1	2	5
200 Area Source Remedial Action	September 2018	3	4	1
Plutonium Finishing Plant Deactivation	September 2029	4	5	5
Treat Solid Waste	September 2032	4	4	3
Complete Tank Farm Closure	September 2034	4	5	2
Tank Waste Retrieval and Tank Closure	September 2034	4	5	2
Store/Dispose Immobilized Low Activity Waste/ High Level Waste	September 2046	2	4	5
Store/Dispose Spent Nuclear Fuel	September 2046	2	3	4

Exhibit C.9-4
Richland Operations Office and the Office of River Protection
Summary of High Programmatic Risk Milestones

Project, Action, Event	Dates	Programmatic Risk Categories*		
		Technological	Work Scope Definition	Intersite Dependency
Complete HLW Disposition & Storage Facility Decontamination & Decommissioning	September 2046	2	4	5

*For a discussion of programmatic risk categories, see Appendix D on the Internet site http://www.em.doe/closure/.

Exhibit C.9-5
Richland Operations Office and the Office of River Protection
Summary of High Programmatic Risk Waste Disposition Data

Stream Name	Waste Stream Activity Name	Programmatic Risk Categories*		
		Technological	Work Scope Definition	Intersite Dependency
Mixed Low-Level Waste (MLLW) Debris to Waste Management (WM)	Other Processing	4	1	1
MLLW Debris to WM	Collect & Treat	4	3	1
MLLW Debris to the Environmental Restoration Disposal Facility (ERDF)	Disposal	4	1	1
MLLW Debris to ERDF	Collect & Dispose	4	3	1
LLW Debris	Collect & Dispose	4	3	1
HAZ Debris to ERDF	Collect & Dispose	4	3	1
HAZ Debris to Commercial Disposal	Collect & Dispose	4	3	1
Contact Handled (CH) TRU Debris to WM	Other Processing	1	5	1
CH TRU Debris to WM	Collect & Treat	5	5	1
MLLW Groundwater (GW) 100/200 Area (Pump/Treat)	Treatment	5	1	1

Exhibit C.9-5
Richland Operations Office and the Office of River Protection
Summary of High Programmatic Risk Waste Disposition Data

Stream Name	Waste Stream Activity Name	Programmatic Risk Categories*		
		Technological	Work Scope Definition	Intersite Dependency
LLW Soils 200 Area	In-Situ Containment	5	1	1
MLLW GW 100/200 Areas	To Be Determined	1	5	1
MLLW GW 100/200 Areas	Response Strategy TBD	5	5	1

*For a discussion of programmatic risk categories, see Appendix D on the Internet site http://www.em.doe/closure/.